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KEY TO IDENTIFYING YOUNG NORTH AMERICAN SPRUCE SEEDLINGS

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ABSTRACT.--Presents a key based on seedling and needle characteristics for identifying seedlings of eight North American spruce species.

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Morphological descriptions of most tree species are based on mature specimens. Nurserymen and researchers, however, often need to identify young tree seedlings. Early identification is also useful to the tree breeder who needs to establish hybridity of material resulting from intra- as well as interspecific crosses.

Presented here are some seedling and needle descriptions and a key for identifying eight of the nine species of spruce native to North America: *Picea breweriana* S. Wats., Brewer spruce; *P. pungens* Engelm., blue spruce; *P. engelmannii*, Parry, Engelmann spruce; *P. glauca* (Moench) Voss., white spruce; *P. mariana* (Mill.) B.S.P., black spruce; *P. sitchensis* (Bong.) Carr., Sitka spruce; *P. chihuahuana* Martinez; and *P. mexicana* Martinez.

The most useful character for identifying spruce seedlings is the margin of the needles produced immediately above the cotyledons; *P. glauca*, *P. engelmannii*, and *P. chihuahuana* have serrated margins; the remaining five species have smooth margins. Margins of needles produced toward the end of the second or during the third growing season are smooth.

Probably the second most useful character is cotyledon number. Mean cotyledon number is fairly characteristic of a species. Black spruce with 4 to 5 cotyledons has the fewest, while *P. chihuahuana* with 9 to 10 has more than the other species. Cotyledon numbers may also be useful in establishing hybridity. Interspecific hybridization studies in *Picea* suggest that there is a maternal influence on cotyledon numbers in the resulting progenies.[1,2]

Needle cross section is useful in identifying Sitka spruce and Brewer spruce: both have flat needles. Brewer spruce also has obtuse or blunt needle apices.

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[1] *Gilbert H. Fechner and Roger W. Clark. Preliminary observations on hybridization of Rocky Mountain spruces.* In *Eleventh For. Tree Breed. Can. Comm. Meet. Proc., 1968, Part 2: 237-247. 1969.*

[2] *D. P. Fowler. A new spruce hybrid--*Picea schrenkiana *x* P. glauca. In *Joint Proc. Second Genet. Workshop Soc. Am. For. and the Seventh Lake States For. Tree Improv. Conf., 1965. p. 44-47. USDA For. Serv. Res. Pap. NC-6, 110 p., illus. 1966.*

Many characters used for identification, particularly growth characters, vary so greatly that they may overlap among species. Characters, such as needle length, total growth, needle color, and number of cotyledons, may be strongly influenced by seed origin, so it is essential to know seed origin. Many of these characters as well as needle curvature may also be influenced by environmental conditions. Spruce seedlings should, therefore, be identified primarily by means of characters such as margin serration, needle shape, and needle apex that are not influenced by seed origin or environment. Finally, species are best identified by evaluation of many individuals and a combination of several characters.

Key to Identifying Young North American Spruce Seedlings

1. Juvenile needles with entire margins 2

    2. Needles flat 3

        3. Needle apex obtuse or blunt, average needle length about 14 mm . . . . . *P. breweriana*

        3. Needle apex sharp, needle length about 18 mm . . . . *P. sitchensis*

    2. Needles four-sided or rarely three-sided 4

        4. Epicotyl curved, needles very long--approximately 29 mm . . . . . *P. mexicana*

        4. Epicotyl straight 5

            5. Cotyledons 4 to 5, needles short--approximately 15 mm . . . . . *P. mariana*

            5. Cotyledons 6 to 7, needles intermediate in length--approximate average 21 mm . . . . . *P. pungens*

1. Juvenile needles with serrated margins 6

    6. Epicotyl curved, cotyledons 9 to 10 . . . . . *P. chihuahuana*

    6. Epicotyl straight, cotyledons 5 to 6 . . . . . *P. glauca*
    P. engelmannii

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